FIRST YEAR OF MESH REGULATION IN THE GEORGES BANK HADDOCK FISHERY

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Destruction of undersized haddock on Georges Bank over the past years has been described by Alexander, Moore, and Kendall (1915), Herrington (1932, 1935, 1936), Schuck (1947, 1948), and Royce and Schuck (1950).

The waste of small unmarketable sizes, which amounted to as many as 70 million fish in a single year, has been decried ever since the otter trawl was introduced in New England in 1905. This waste could have been prevented by the use of larger meshes in the nets, which would have allowed the unwanted fish to escape, but there was no control of this offshore fishery until the organization of the International Commission for the Northwest Atlantic Fisheries. Under this Commission, an international mesh regulation for haddock fishing was brought into effect for Georges Bank and the Gulf of Maine (Subarea 5 of the Commission) on June 1, 1953.

The biological basis for the mesh regulation was presented by Graham (1952). From growth rates and mortality rates of the Georges Bank stock it was calculated that the fishery would be most productive, with the present size of fleet, if the haddock were not taken until they were 3 years old. Since haddock of this age are of marketable size, the initial effects of an advance to this age of first capture might be severe, and consequently it was decided to recommend increasing the mesh size in two steps. The first step, advancing the age of first capture to 2-1/2 years, was designed to prevent capture of most of the fish noramlly caught and discarded, while permitting the escape of a very small percentage of the smallest marketable sizes. This step called for use of nets of 4-1/2 inch mesh, inside stretched measurement.

The ultimate effect of this first step was expected to be an increase in the production of the fishery by about 30 percent, provided the fishing effort remained constant. The initial effect was expected to be a slight decline in landings, due to the loss of a few of the smaller fish of marketable size, but this initial effect was expected to be offset to some extent by increased efficiency of the nets with larger mesh.

The United States recommendation to the Commission was based on many years of research on the Georges Bank haddock, and consequently there was considerable confidence in the estimates of the long-term benefits of conserving the small fish. It was deemed advisable, however, to set up a special program of study to determine what the effect of the regulation would be. The Commission desired to subject the regulation to the most rigorous testing that could be devised.

As part of this testing program, observers were sent to sea on commercial trawlers to sample the fish that were discarded as well as the

fish that were retained and landed. This part of the program was started in June 1951, 2 years before the regulation came into effect. This sampling at sea is continuing. Two reports of catch analyses made under this program during the pre-regulation period have already appeared (Premetz 1953, Premetz et al. 1954).

A later part of the testing program was the licensing of a few vessels to fish with small-mesh nets, in order to provide an index of abundance of 2-year-old fish comparable with that obtained before regulation. This index is necessary for appraising the ultimate benefits from use of the larger mesh.

This group of "study boats" has made possible a very valuable comparison of catches of vessels using large-mesh nets and of those using small-mesh nets. For convenience, these two groups of vessels will be referred to in the text and tables as "large-mesh vessels" and "small-mesh vessels." Through the cooperation of the fishermen, biologists have made frequent trips to sea on vessels of both groups.

The purpose of the present paper is to report upon the quantities of small fish protected by the regulation and to present an evaluation of the effects of the regulation upon the quantities and sizes of fish landed from Georges Bank during the first year of regulation.

Analysis of Catch

The initial effect of increasing mesh size depends upon the level of selection of the new net rate in relation to the level at which the fishermen have been culling, and upon the relative abundance of sizes lying within the selection range of the new net at the time its use is begun.

Before regulation, the fishermen had been discarding fish less than 34 to 35 cm. in length (Premetz 1953, Premetz et al. 1954). The 50-percent point on the selection curve of the 4-1/2 inch mesh is about 37.5 cm., that is, half the fish 37.5 cm. in length will escape through cod-end meshes that average 4-1/2 inches inside measurement. Thus the new mesh permits the escape of some fish that would normally be caught and marketed. The loss to the fisherman will be greatest when fish of 37.5 cm. in length are most abundant. Georges Bank haddock are this length when they are about 2-1/2 years old. Since they are spawned from February to March, they attain this age and size in the fall of their third year of life.

Since the strengths of the year classes of haddock vary extremely, there will be an abundance of fish of this critical size only in fall seasons when a dominant year class reaches the age of 2-1/2 years. When the mesh regulation was put into effect in June 1953, fish nearest this age were the 1951 year class. Since 1951 was a very weak year class, the loss of small fish during the summer and fall of 1953 was very light.

The next year class, 1952, was a very strong one. This report does not cover the fall of the year 1954, when the 1952 year class is expected to reach the critical size with respect to the selectivity of the 4-1/2 inch mesh, but in the second quarter of 1954, large numbers escaped through the meshes of the nets as will be shown.

The effect of the mesh size in relation to year-class strength can best be understood by a study of the size composition of the catches of the large-mesh and small-mesh vessels. In figures 1 to 6 are presented the size compositions of average catches for each 3-month period from January 1953 to June 1954. The first two quarters (figs. 1 and 2) are for the 6-month period immediately preceding regulation and continue the reporting of size compositions of catches presented in previous reports (Premetz 1953, Premetz et al. 1954). Vessels were not using large mesh during this period.1/ The last four graphs (figs. 3-6) are for the first year of regulation, beginning July 1, 1953, during which both large-mesh and small-mesh vessels were operating.

To understand the length frequency curves it is necessary to relate them to year classes. In early 1953 the dominant year class was from the 1950 brood. This abundant group of 3-year-old fish was responsible for the prominent mode in the length frequency curve for the first quarter of 1953 (fig. 1). This mode, then centered at about 43 cm., progressed with the growth of the fish to about 52 cm. in the first quarter of 1954 (fig. 5). During the second quarter of 1954 this year class was taken in such relatively small quantities that it cannot be identified on the length frequency curve (fig. 6).

The following year class, that of 1951, was very weak and nowhere produces a mode on the length frequency curves.

The group following this, the 1952 year class, was another strong one. It is seen first on the length frequency curves in the second quarter of 1953 (fig 2) when large quantities were caught and discarded by the small-mesh vessels before regulation. The average length at that time was about 27 cm.. The growth in size of this year class can be followed by the progression of the mode through the graphs to the second quarter of 1954 when the mode was centered at about 40 cm. (fig. 6).

A very striking change in size composition occurred between the first and second quarters of 1954. By the second quarter, most of the 1952 year class had attained marketable size. This group of 2-year-old fish then dominated the catches. The previous dominant year class, now 4 years old, is hardly discernible in the length frequency curve for this quarter because of the extreme abundance of the 2-year-olds. The 4-year-old group of fish may not have been actually less abundant than in the previous quarter but simply relatively less so. (Note that the vertical scale in figure 6 is not comparable to that in figure 5).

1/ A few vessels converted promptly about June 1, 1953, but data for these vessels were not used for June in this report.

The quantities of haddock culled and discarded at sea by small-mesh and large-mesh vessels during each quarter of the present study are presented in tables 1 to 6. Reference to these tables and to the size-composition curves (figs. 1-6) shows how the amount of culling and discard is related to the size of mesh used and to the sizes of fish present on the banks during this period of study.

During the first quarter (January to March 1953) of the present study (table 1 and fig. 1) only small mesh was used. The dominant year class at that time was 3 years old and of such a size that only moderate amounts were discarded. The following year class of 2-year-olds was the weak 1951 year class and only a few were caught. Consequently the total discard during that quarter was moderate, about 3,000 fish per trip (table 7).

The second period of this study, April to June 1953, (table 2 and fig. 2) was also before regulation, when all vessels used small mesh. By this time the fish of the dominant 1950 year class were all of marketable size, so practically none of this group were discarded. The weak 1951 year class again was caught only in small numbers. The heavy discard during this quarter shown by the mode in the length frequency curve at about 27 cm. was composed largely of the next dominant group in the population, the 1952 year class. The discard per trip for this quarter was over 7,000 fish.

The next quarter, July to September 1953, (table 3 and fig. 3) can be considered the first quarter of regulation (see footnote 1, p. 3). By this period some of the 1952 year class had attained marketable size. This group was taken in considerable quantities by the vessels with small mesh, but most were discarded. The discard by small-mesh vessels was over 3,000 fish per trip. The large-mesh nets retained practically none of this group, and the discard by large-mesh vessels was accordingly very light (table 7).

The dominant 1950 year class along with the weak 1951 year class provided many fish within the selection range of both sizes of mesh. Consequently, during the first quarter of regulation the large mesh was very effective not only in preventing the waste of undesirable sizes but also in permitting the escape of many fish in the smallestsizes normally retained for market. This effect is vividly demonstrated by the two length frequency curves for this quarter (fig. 3).

Although this effect tends to reduce the landings of the large-mesh vessels, these vessels, in fact, landed more pounds of haddock per trip than the small-mesh vessels during this quarter (table 8). The reason for this was a greater catch of larger fish by the large-mesh nets. Apparently the large-mesh nets are more efficient in capturing the larger, older fish. This effect, too, is amply demonstrated by the length frequency curves (fig. 3). The result of the differences in selectivity and in efficiency of the larger mesh is a larger average size of fish landed by the large-mesh vessels. For the quarter under discussion, the average weights were 2.0 and 2.3 pounds, respectively, for the small and large meshes. The number of fish landed per trip by the large-mesh vessels was less, but the total weight of fish was greater (table 7).

During the second quarter of regulation, October to December 1953, the incoming 1952 year class became an important part of the fishery although the 1950 year class retained its dominance (table 4 and fig. 4). Discard during this quarter was confined entirely to the incoming year class. As noted in the length frequency curves, all of the waste was by the small-mesh vessels; the large-mesh vessels marketed all haddock caught. The discard by small-mesh vessels was about 6,000 fish per trip.

As in the previous quarter, the large-mesh vessels caught proportionately fewer of the smaller marketable fish but more larger ones with the result that the landings per trip of the large-mesh vessels were greater than those of the other group of boats. The large-mesh vessels caught fewer fish but landed more pounds of fish since the average weight of the fish caught was greater (table 7).

This direct comparison of landings of the two groups of vessels is not conclusive, as it takes no account of differences in the sizes and efficiencies of the vessels concerned. These factors can be largely eliminated by comparing each group's landings during this quarter with its landings in the corresponding quarter of the previous year and then comparing the changes in landings of the one group with that of the other. Such a comparison is presented in table 8.[2/] It will be noted that the landings of haddock per trip by the group of small-mesh vessels dropped about 22 percent while that of the large-mesh vessels dropped only about 10 percent. It is also of interest to note that the drop in landings of all groundfish showed a similar difference.

The third quarter of regulation, January to March 1954, was characterized by an abundance of haddock in two dominant year classes, 1950 and 1952 (table 5 and fig. 5). The availability of the 1952 year class had increased so that large quantities were taken by the small-mesh vessels. Most of these, however, were discarded at sea. Although more fish per trip were discarded by small-mesh vessels during this quarter than any quarter of this study period, (over 7,500 per trip) there was no discard by the vessels using the regulation large mesh (table 7). As in previous quarters, the large-mesh vessels caught fewer fish but landed more pounds per trip than did the small-mesh vessels. When the 1954 landings of the two groups are compared with those for the same quarter in 1953 (table 8), it is noted that neither group enjoyed an advantage except that large-mesh vessels appeared to fare better in regard to total groundfish.

Conditions changed in the fourth quarter of regulation, April to June 1954. The 1952 year class was fully recruited and dominated the catch to an extreme degree. A glance at the length frequency curves for this quarter (fig. 6) shows prominant modes at about 40 cm. These modes represent this 1952 year class of 2-year-old fish.

2/ This comparison was not made for the first quarter of regulation because of insufficient numbers of vessels that had used one size of net consistently throughout the quarter.

The discard of fish during this quarter was the lowest of any quarter during the period of study. This was due to two circumstances: First, almost all the 1952 year class had grown to marketable size, and second, the following year class (1953) which normally would have been caught and discarded in large numbers at this season of the year was entirely absent (compare figure 2, for April to June 1953, when the dominant 1952 year class was entering the fishery).

The size composition of the population of haddock fished during this quarter was such as to favor the small-mesh vessels. The sizes of the very dominant 1952 year class lay within the selection range of the large-mesh nets so that many of the smallest marketable sizes escaped through these nets but not through the nets of small mesh. Since large haddock were relatively scarce, the greater efficiency of the large mesh in catching larger fish was not sufficiently effective to balance the loss of smaller fish. The landings of haddock by the selected group of small-mesh vessels increased 55 percent over that for the same period in the previous year while the landings of the large-mesh vessels increased only 32 percent (table 8). There was a similar difference in the landings of all groundfish for the two groups of vessels. As the fish in the 1952 year class grow to sizes beyond the selection range of the nets, the large mesh will lose few marketable fish because the following (1953) year class is weak. The large mesh will regain its advantages through its greater efficiency in catching larger sizes.

CONCLUSIONS

1. The large-mesh nets are more efficient in capturing larger fish. This factor has been so effective that it more than compensated for the reduced quantities of small fish taken during three of the four quarters of the first year of regulation.

2. When the haddock fleet converted to large-mesh nets the dominant year class (1950) was composed of 3-year-old fish which were mostly above the selection range of the net. Consequently, few fish were lost to the industry, while the increased efficiency of the net in capturing larger sizes resulted in greater landings than would have been made with small-mesh nets.

3. This situation prevailed until the last quarter of the year when the next dominant year class (1952) entered the fishery. Since this group was composed of sizes lying within the selection range of the regulation net, and since the fleet concentrated on these small fish, there was during this quarter a loss in landings of regulated vessels as compared with landings of small-mesh vessels set up as a control.

4. It is estimated that 12-1/2 million haddock have been protected by the large-mesh nets during the first year of regulation. It is too early to measure the benefit to the fishery of the saving of these small fish, but the long-term benefit of the large mesh is expected to be greater than originally estimated. The prediction of a 30-percent benefit was based on an average age composition for the 17-year period 1931 to 1947 (Graham 1952). However, the sizes of Georges Bank haddock are now significantly below this average. In 1950 the quantity of scrod (market category of haddock under 2.5 pounds) exceeded the quantity of large haddock landed, for the first time in the history of the fishery. This situation has prevailed ever since. The Georges Bank haddock fishery since that date has been supported largely by 2- and 3-year-old fish in dominant year classes of alternate years, 1948, 1950, and 1952, with very weak intervening year classes (Schuck and Clark 1951, Clark 1952). There are indications that this pattern will continue through 1954. Consequently, there is every reason to believe that the benefit to be derived from saving the small fish will be greater than had been predicted on the basis of the average year for the period before 1950. This benefit will, of course, be added to that resulting from the increased efficiency of the large mesh which was apparent immediately.

REFERENCES

Alexander, A. B., H. F. Moore, and W. C. Kendall
1915. Otter-trawl fishery. Appendix VI, Rept. U. S. Commissioner of Fisheries for 1914. 97 pp.

Clark, John R.
1952. Georges Bank haddock fishery--1951. U. S. Fish and Wildlife Service, Comm. Fish. Rev., vol. 14, No. 8, pp. 1-4.

Graham, Herbert W.
1952. Mesh regulation to increase the yield of the Georges Bank haddock fishery. International Comm. Northwest Atlantic Fisheries, part 3, 2d. annual report, pp. 23-33.

Herrington, W. C.
1932. Conservation of immature fish in otter trawling. Trans. Amer. Fish. Soc., vol. 62, pp. 57-63.

Herrington, W. C.
1935. Modifications in gear to curtail the destruction of undersized fish in otter trawling. Bureau of Fisheries, U. S. Dept. of Commerce, Investigational Report 24. 48 pp.

1936. Decline in haddock abundance on Georges Bank and a practical remedy. Bureau of Fisheries, U. S. Dept. of Commerce, Fishery Circular 23, issued July 1936. 22 pp.

Prometz, Ernest D.
1953. Destruction of undersized haddock on Georges Bank, 1947-1951. U. S. Fish and Wildlife Service, Spec. Sci. Report--Fisheries No. 96. 33 pp.

Prometz, Ernest D., R. L. Cory, J. W. McKee, and Craig Slater
1954. Destruction of undersized haddock on Georges Bank, 1952. U. S. Fish and Wildlife Service, Spec. Sci. Report--Fisheries No. 129. 34 pp.

Royce, W. F., and H. A. Schuck
1950. Minimum size limits for fish suggested. Atlantic Fisherman, vol. 31, No. 4 (May), pp. 19 and 32.

Schuck, H. A.
1947. Protecting baby scrod raises production. Atlantic Fisherman, vol. 28, No. 11 (Dec.) pp. 13 and 46.

1948. Current haddock situation on Georges Bank. U. S. Fish and Wildlife Service, Comm. Fish. Rev., vol. 10, No. 10 (Oct.), pp. 1-6.

Schuck, H. A. and John R. Clark
1951. 1950--An unusual haddock year on Georges Bank. U. S. Fish and Wildlife Service, Comm. Fish. Rev., vol. 13, No. 6 (June), pp. 27-29.

TABLE 1 .--Size composition of haddock caught on Georges Bank January to March 1953.

Length in Cms.	Length in inches	Ave. wt. (gutted) in pounds	Ave. Trip - Small Mesh Discarded	Landed	Total Caught
20	7.9	0.20	1		1
21	8.3	0.23	0		0
22	8.7	0.27	4		4
23	9.1	0.30	4		4
24	9.4	0.34	3		3
25	9.8	0.38	15		15
26	10.2	0.43	26		26
27	10.6	0.47	50		50
28	11.0	0.52	105		105
29	11.4	0.58	161		161
30	11.8	0.64	206		206
31	12.2	0.70	312	10	322
32	12.6	0.76	413	40	453
33	13.0	0.83	435	77	512
34	13.4	0.90	357	351	708
35	13.8	0.98	323	585	908
36	14.2	1.06	193	923	1,116
37	14.6	1.14	111	1,057	1,168
38	15.0	1.23	42	1,486	1,528
39	15.4	1.32	9	1,679	1,688
40	15.8	1.40	10	2,207	2,217
41	16.1	1.50	1	2,296	2,297
42	16.5	1.60	1	2,368	2,369
43	16.9	1.70		2,651	2,651
44	17.3	1.80		2,494	2,494
45	17.7	2.00		2,135	2,135
46	18.1	2.10		1,780	1,780
47	18.5	2.20		1,756	1,756
48	18.9	2.40		1,655	1,655
49	19.3	2.50		1,418	1,418
50	19.7	2.60		1,325	1,325

TABLE 1 .--Size composition of haddock caught on Georges Bank January to March 1953. (Cont'd)

Length in Cms.	Length in inches	Ave. wt. (gutted) in pounds	Ave. Trip - Small Mesh Discarded	Landed	Total Caught
51	20.1	2.80		1,161	1,161
52	20.5	2.90		1,064	1,064
53	20.9	3.10		995	995
54	21.3	3.20		884	884
55	21.7	3.40		802	802
56	22.1	3.60		780	780
57	22.4	3.80		732	732
58	22.8	4.00		605	605
59	23.2	4.20		505	505
60	23.6	4.40		404	404
61	24.0	4.60		378	378
62	24.4	4.80		297	297
63	24.8	5.00		285	285
64	25.2	5.20		266	266
65	25.6	5.40		239	239
66	26.0	5.70		240	240
67	26.4	5.90		190	190
68	26.8	6.20		165	165
69	27.2	6.40		144	144
70	27.6	6.70		172	172
71	28.0	7.00		115	115
72	28.3	7.20		97	97
73	28.7	7.50		48	48
74	29.1	7.80		57	57
75	29.5	8.10		14	14
76	29.9	8.40		10	10
77	30.3	8.70		10	10
78	30.7	9.00		8	8
79	31.1	9.30		2	2
80	31.5	9.70		2	2
81	31.9	10.00		0	0
82	32.3	10.30		0	0
83	32.7	10.60		4	4
TOTAL			2,782	38,968	41,750

TABLE 2.--Size composition of haddock caught on Georges Bank, April to June 1953.

Length in Cms.	Length in inches	Ave. wt. (gutted) in pounds	Ave. Trip - Small Mesh Discarded	Landed	Total Caught
16	6.3	0.10	7		7
17	6.7	0.12	7		7
18	7.1	0.13	11		11
19	7.5	0.15	14		14
20	7.9	0.17	22		22
21	8.3	0.20	31		31
22	8.7	0.23	74		74
23	9.1	0.26	208		208
24	9.4	0.29	606		606
25	9.8	0.33	1,018		1,018
26	10.2	0.36	1,110		1,110
27	10.6	0.41	1,204		1,204
28	11.0	0.45	941	1	942
29	11.4	0.50	683	3	686
30	11.8	0.55	368	14	382
31	12.2	0.60	265	33	298
32	12.6	0.66	178	33	211
33	13.0	0.72	149	95	244
34	13.4	0.79	137	264	401
35	13.8	0.85	100	479	579
36	14.2	0.92	56	813	869
37	14.6	1.00	18	1,155	1,173
38	15.0	1.08	9	1,491	1,500
39	15.4	1.16	4	1,560	1,564
40	15.8	1.20	1	1,823	1,824
41	16.1	1.30		2,060	2,060
42	16.5	1.40		2,293	2,293
43	16.9	1.50		2,182	2,182
44	17.3	1.60		2,203	2,203
45	17.7	1.70		2,620	2,620

TABLE 2.--Size composition of haddock caught on Georges Bank, April to June 1953.

Length in Cms.	Length in inches	Ave. wt. (gutted) in pounds	Ave. Trip - Small Mesh Discarded	Landed	Total Caught
46	18.1	1.80		2,352	2,352
47	18.5	2.00		2,223	2,223
48	18.9	2.10		1,785	1,785
49	19.3	2.20		1,549	1,549
50	19.7	2.30		1,271	1,271
51	20.1	2.50		1,077	1,077
52	20.5	2.60		923	923
53	20.9	2.80		748	748
54	21.3	2.90		633	633
55	21.7	3.10		533	533
56	22.1	3.20		525	525
57	22.4	3.40		466	466
58	22.8	3.60		370	370
59	23.2	3.80		270	270
60	23.6	3.90		283	283
61	24.0	4.10		247	247
62	24.4	4.30		212	212
63	24.8	4.50		158	158
64	25.2	4.70		108	108
65	25.6	4.90		130	130
66	26.0	5.10		98	98
67	26.4	5.40		92	92
68	26.8	5.60		67	67
69	27.2	5.80		58	58
70	27.6	6.10		47	47
71	28.0	6.30		27	27
72	28.3	6.60		56	56
73	28.7	6.80		24	24
74	29.1	7.10		33	33
75	29.5	7.40		17	17
76	29.9	7.70		4	4
77	30.3	7.90		4	4
78	30.7	8.20		0	0
79	31.1	8.60		3	3
80	31.5	8.90		3	3
81	31.9	9.20		6	6
TOTAL			7,221	35,532	42,753

TABLE 3 .--Size composition of haddock caught on Georges Bank, July to September 1953.

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
21	8.3	0.23				9		9
22	8.7	0.26				0		0
23	9.1	0.30				0		0
24	9.4	0.33				18		18
25	9.8	0.38	7		7	7		7
26	10.2	0.42	0		0	48		48
27	10.6	0.47	4		4	49		49
28	11.0	0.52	23		23	38		38
29	11.4	0.57	37		37	266		266
30	11.8	0.63	44		44	382		382
31	12.2	0.69	108		108	637	10	647
32	12.6	0.75	136		136	744	14	758
33	13.0	0.82	75		75	577	70	647
34	13.4	0.89	69	24	93	281	350	631
35	13.8	0.96	39	115	154	99	414	513
36	14.2	1.05	22	263	285	57	860	917
37	14.6	1.13	24	373	397	36	1,343	1,379
38	15.0	1.22	34	539	573	18	1,793	1,811
39	15.4	1.31	14	832	846		1,995	1,995
40	15.8	1.40		1,189	1,189		2,292	2,292
41	16.1	1.50		1,458	1,458		2,251	2,251
42	16.5	1.60		1,904	1,904		2,815	2,815
43	16.9	1.70		2,125	2,125		2,581	2,581
44	17.3	1.80		2,426	2,426		1,584	1,584
45	17.7	2.00		2,567	2,567		2,938	2,938

TABLE 3 .--Size composition of haddock caught on Georges Bank, July to September 1953. (Cont'd)

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
46	18.1	2.10		2,785	2,785		2,583	2,583
47	18.5	2.20		2,539	2,539		2,468	2,468
48	18.9	2.30		2,341	2,341		2,177	2,177
49	19.3	2.50		2,025	2,025		1,746	1,746
50	19.7	2.60		1,881	1,881		1,456	1,456
51	20.1	2.80		1,682	1,682		1,011	1,011
52	20.5	2.90		1,221	1,221		773	773
53	20.9	3.10		1,018	1,018		737	737
54	21.3	3.20		757	757		425	425
55	21.7	3.40		639	639		372	372
56	22.1	3.60		608	608		285	285
57	22.4	3.80		338	338		210	210
58	22.8	4.00		309	309		124	124
59	23.2	4.10		262	262		158	158
60	23.6	4.30		169	169		119	119
61	24.0	4.50		124	124		110	110
62	24.4	4.80		164	164		65	65
63	24.8	5.00		149	149		60	60
64	25.2	5.20		83	83		55	55
65	25.6	5.40		83	83		48	48
66	26.0	5.60		72	72		46	46
67	26.4	5.90		47	47		41	41
68	26.8	6.10		46	46		14	14
69	27.2	6.40		29	29		35	35
70	27.6	6.70		20	20		6	6

TABLE 3 .--Size composition of haddock caught on Georges Bank, July to September 1953. (Cont'd)

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
71	28.0	6.90		9	9		6	6
72	28.3	7.20		42	42		19	19
73	28.7	7.50		9	9		11	11
74	29.1	7.80		18	18		2	2
75	29.5	8.10		1	1		5	5
76	29.9	8.40		1	1		1	1
77	30.3	8.70					1	1
78	30.7	9.00					1	1
79	31.1	9.30					0	0
80	31.5	9.60					0	0
81	31.9	10.00					1	1
TOTAL			636	33,286	33,922	3,266	36,481	39,747

TABLE 4.--Size composition of haddock caught on Georges Bank, October to December 1953.

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
26	10.2	0.40				57		57
27	10.6	0.45				57		57
28	11.0	0.50				117		117
29	11.4	0.55				315		315
30	11.8	0.61				572	13	585
31	12.2	0.67				1,033	51	1,084
32	12.6	0.73		11	11	1,023	181	1,204
33	13.0	0.80		53	53	975	368	1,343
34	13.4	0.88		170	170	776	565	1,341
35	13.8	0.95		452	452	518	1,881	2,399
36	14.2	1.04		530	530	257	1,450	1,707
37	14.6	1.12		553	553	161	1,511	1,672
38	15.0	1.21		599	599	28	1,326	1,354
39	15.4	1.31		581	581	0	1,020	1,020
40	15.8	1.40		966	966	15	1,279	1,294
41	16.1	1.50		740	740		863	863
42	16.5	1.60		857	857		1,284	1,284
43	16.9	1.70		1,079	1,079		1,045	1,045
44	17.3	1.80		1,110	1,110		1,024	1,024
45	17.7	2.00		1,132	1,132		804	804
46	18.1	2.10		1,270	1,270		1,039	1,039
47	18.5	2.20		1,205	1,205		1,071	1,071
48	18.9	2.40		1,152	1,152		1,091	1,091
49	19.3	2.50		994	994		795	795
50	19.7	2.70		1,040	1,040		984	984

TABLE 4.--Size composition of haddock caught on Georges Bank, October to December 1953. (Cont'd)

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
51	20.1	2.80		870	870		702	702
52	20.5	3.00		791	791		674	674
53	20.9	3.20		677	677		504	504
54	21.3	3.40		607	607		472	472
55	21.7	3.50		598	598		401	401
56	22.1	3.70		438	438		350	350
57	22.4	3.90		399	399		247	247
58	22.8	4.10		384	384		225	225
59	23.2	4.30		249	249		118	118
60	23.6	4.50		300	300		210	210
61	24.0	4.80		190	190		115	115
62	24.4	5.00		187	187		116	116
63	24.8	5.20		98	98		77	77
64	25.2	5.50		55	55		59	59
65	25.6	5.70		78	78		36	36
66	26.0	6.00		47	47		41	41
67	26.4	6.20		23	23		15	15
68	26.8	6.50		41	41		26	26
69	27.2	6.80		12	12		2	2
70	27.6	7.10		28	28		14	14
71	28.0	7.40		24	24		8	8
72	28.3	7.70		6	6		10	10
73	28.7	8.00		0	0		8	8
74	29.1	8.30		4	4		5	5
75	29.5	8.70		2	2		2	2
76	29.9	9.00		1	1			
TOTAL			0	20,603	20,603	5,904	24,082	29,986

TABLE 5 .--Size composition of haddock caught on Georges Bank, January to March 1954.

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
22	8.7	0.27				27		27
23	9.1	0.30				118		118
24	9.4	0.34				166		166
25	9.8	0.38				414		414
26	10.2	0.43				469		469
27	10.6	0.47				366		366
28	11.0	0.52				378		378
29	11.4	0.58				350		350
30	11.8	0.64				416		416
31	12.2	0.70				477		477
32	12.6	0.76		35	35	566	68	634
33	13.0	0.83		119	119	854	139	993
34	13.4	0.90		189	189	919	234	1,153
35	13.8	0.98		172	172	752	360	1,112
36	14.2	1.06		132	132	600	358	958
37	14.6	1.14		106	106	394	370	764
38	15.0	1.23		90	90	163	387	550
39	15.4	1.32		171	171	71	262	333
40	15.8	1.40		171	171	46	390	436
41	16.1	1.50		306	306	0	232	232
42	16.5	1.60		434	434	24	405	429
43	16.9	1.70		470	470		346	346
44	17.3	1.80		707	707		578	578
45	17.7	2.00		632	632		654	654

TABLE 5.--Size composition of haddock caught on Georges Bank, January to March 1954. (Cont'd)

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
46	18.1	2.10		756	756		650	650
47	18.5	2.20		660	660		794	794
48	18.9	2.40		810	810		640	640
49	19.3	2.50		1,066	1,066		1,032	1,032
50	19.7	2.60		1,039	1,039		1,040	1,040
51	20.1	2.80		999	999		890	890
52	20.5	2.90		1,039	1,039		760	760
53	20.9	3.10		1,170	1,170		818	818
54	21.3	3.20		1,091	1,091		829	829
55	21.7	3.40		1,108	1,108		739	739
56	22.1	3.60		790	790		941	941
57	22.4	3.80		793	793		699	699
58	22.8	4.00		609	609		606	606
59	23.2	4.20		696	696		540	540
60	23.6	4.40		526	526		590	590
61	24.0	4.60		561	561		465	465
62	24.4	4.80		427	427		290	290
63	24.8	5.00		391	391		338	338
64	25.2	5.20		284	284		304	304
65	25.6	5.40		249	249		228	228
66	26.0	5.70		286	286		121	121
67	26.4	5.90		198	198		234	234
68	26.8	6.20		197	197		157	157
69	27.2	6.40		102	102		169	169
70	27.6	6.70		123	123		75	75

TABLE 5 .--Size composition of haddock caught on Georges Bank, January to March 1954. (Cont'd)

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
71	28.0	7.00		54	54		23	23
72	28.3	7.20		50	50		60	60
73	28.7	7.50		55	55		57	57
74	29.1	7.80		49	49		13	13
75	29.5	8.10		25	25		13	13
76	29.9	8.40		18	18		13	13
77	30.3	8.70		8	8			
78	30.7	9.00		2	2			
TOTAL			0	19,965	19,965	7,570	18,911	26,481

TABLE 6 .--Size composition of haddock caught on Georges Bank, April to June 1954.

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
24	9.4	0.29				1		1
25	9.8	0.33				4		4
26	10.2	0.36				7		7
27	10.6	0.41				13		13
28	11.0	0.45	10		10	44		44
29	11.4	0.50	10		10	128		128
30	11.8	0.55	36		36	126	18	144
31	12.2	0.60	32	9	41	351	48	399
32	12.6	0.66	92	48	140	400	146	546
33	13.0	0.72	106	183	289	417	779	1,196
34	13.4	0.79	134	516	650	479	1,622	2,101
35	13.8	0.85	91	1,016	1,107	338	2,956	3,294
36	14.2	0.92	50	1,690	1,740	219	4,869	5,088
37	14.6	1.00	10	2,628	2,638	138	6,519	6,657
38	15.0	1.08	3	3,837	3,840	51	8,060	8,111
39	15.4	1.16		4,963	4,963	30	8,404	8,434
40	15.8	1.20		4,656	4,656		7,789	7,789
41	16.1	1.30		4,827	4,827		6,161	6,161
42	16.5	1.40		5,066	5,066		5,683	5,683
43	16.9	1.50		3,499	3,499		3,988	3,988
44	17.3	1.60		3,161	3,161		2,328	2,328
45	17.7	1.70		2,319	2,319		2,408	2,408

TABLE 6.--Size composition of haddock caught on Georges Bank, April to June 1954. (Cont'd)

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
46	18.1	1.80		1,694	1,694		1,809	1,809
47	18.5	2.00		1,409	1,409		1,690	1,690
48	18.9	2.10		1,256	1,256		1,391	1,391
49	19.3	2.20		987	987		903	903
50	19.7	2.30		938	938		802	802
51	20.1	2.50		892	892		575	575
52	20.5	2.60		672	672		598	598
53	20.9	2.80		716	716		554	554
54	21.3	2.90		587	587		341	341
55	21.7	3.10		488	488		253	253
56	22.1	3.20		380	380		282	282
57	22.4	3.40		317	317		167	167
58	22.8	3.60		292	292		128	128
59	23.2	3.80		218	218		125	125
60	23.6	3.90		181	181		114	114
61	24.0	4.10		159	159		70	70
62	24.4	4.30		86	86		64	64
63	24.8	4.50		85	85		65	65
64	25.2	4.70		76	76		51	51
65	25.6	4.90		44	44		92	92
66	26.0	5.10		44	44		54	54
67	26.4	5.40		37	37		2	2
68	26.8	5.60		31	31		5	5
69	27.2	5.80		16	16		21	21
70	27.6	6.10		12	12		25	25

TABLE 6 .--Size composition of haddock caught on Georges Bank, April to June 1954. (Cont'd)

Length in cms.	inches	Ave. wt. (gutted) in pounds	Ave. Trip - Large Mesh			Ave. Trip - Small Mesh		
			Discarded	Landed	Total Caught	Discarded	Landed	Total Caught
71	28.0	6.30		15	15		0	0
72	28.3	6.60		18	18		20	20
73	28.7	6.80		12	12		12	12
74	29.1	7.10		13	13		8	8
75	29.5	7.40		5	5		2	2
76	29.9	7.70		5	5		6	6
77	30.3	7.90		8	8			
78	30.7	8.20		0	0			
79	31.1	8.60		0	0			
80	31.5	8.90		0	0			
81	31.9	9.2		2	2			
TOTAL			574	50,113	50,687	2,746	72,007	74,753

TABLE 7.--Catch records for average trip of small mesh and large mesh vessels, January 1953 to June 1954.

		Average Trip			
		January - March 1953	April - June 1953	July - September 1953	
		Small mesh	Small mesh	Small mesh	Large mesh
Pounds:	discarded	2,341	3,650	2,825	486
	landed	82,324	69,024	73,733	76,389
	caught	84,665	72,674	76,558	76,875
Numbers:	discarded	2,782	7,221	3,266	636
	landed	38,968	35,532	36,481	33,286
	caught	41,750	42,753	39,747	33,922
Average weight per fish:	discarded	0.84	0.50	0.86	0.76
	landed	2.11	1.94	2.02	2.29
	caught	2.03	1.70	1.93	2.27

TABLE 7 .--Catch records for average trip of small mesh and large mesh vessels, January 1953 to June 1954. (Cont'd)

Average Trip

		October - December 1953		January - March 1954		April - June 1954	
		Small mesh	Large mesh	Small mesh	Large mesh	Small mesh	Large mesh
Pounds:	discarded	5,302	0	5,750	0	2,300	400
	landed	47,700	49,600	56,500	63,700	102,800	82,500
	caught	53,002	49,600	62,250	63,700	105,100	82,900
Numbers:	discarded	5,904	0	7,570	0	2,746	574
	landed	24,082	20,603	18,911	19,965	72,007	50,113
	caught	29,986	20,603	26,481	19,965	74,753	50,687
Average weight per fish:	discarded	0.90	-	0.76	-	0.84	0.70
	landed	1.98	2.41	2.99	3.19	1.40	1.65
	caught	1.77	2.41	2.35	3.19	1.38	1.64

TABLE 8.--Groundfish landings from Georges Bank by small and large mesh Boston trawlers for regulated periods compared with same periods in the previous year.

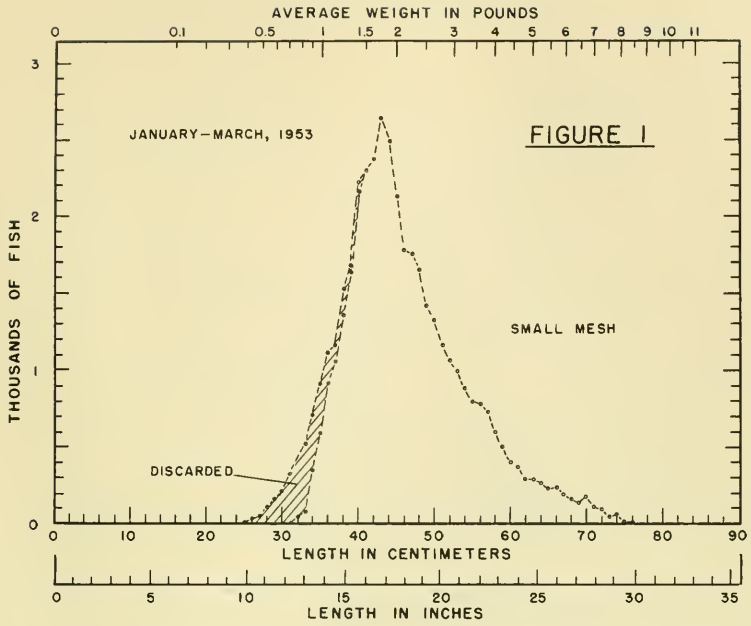
	Landings of Haddock Pounds per trip			Landings of Groundfish Pounds per trip		
	1952	1953	% change	1952	1953	% change
Oct.-Dec.						
Group A (Small mesh) 1/	60,900	47,700	-21.7	75,200	67,300	-10.5
Group B (Large mesh) 3/	54,800	49,600	-9.5	75,400	75,500	+0.1
	1953	1954	% change	1953	1954	% change
Jan.-Mar.						
Group A (Small mesh) 2/	65,500	56,500	-13.7	83,500	85,400	+2.3
Group B (Large mesh) 4/	74,300	63,700	-14.3	96,000	101,000	+5.2
	1953	1954	% change	1953	1954	% change
Apr.-June						
Group A (Small mesh) 2/	66.2	102.8	+55.3	80.3	113.5	+41.3
Group B (Large mesh) 4/	62.5	82.5	+32.0	78.6	97.3	+23.8

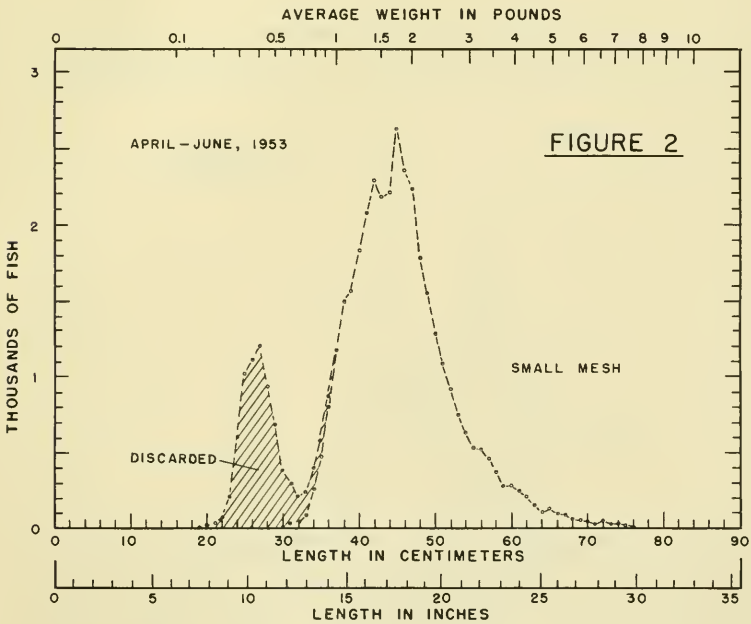
1/ Eight large otter trawlers licensed to fish with small mesh from June to December, 1953: Arlington, Atlantic, Texas, Thomas A. Whalen, Weymouth, and William J. O'Brien.

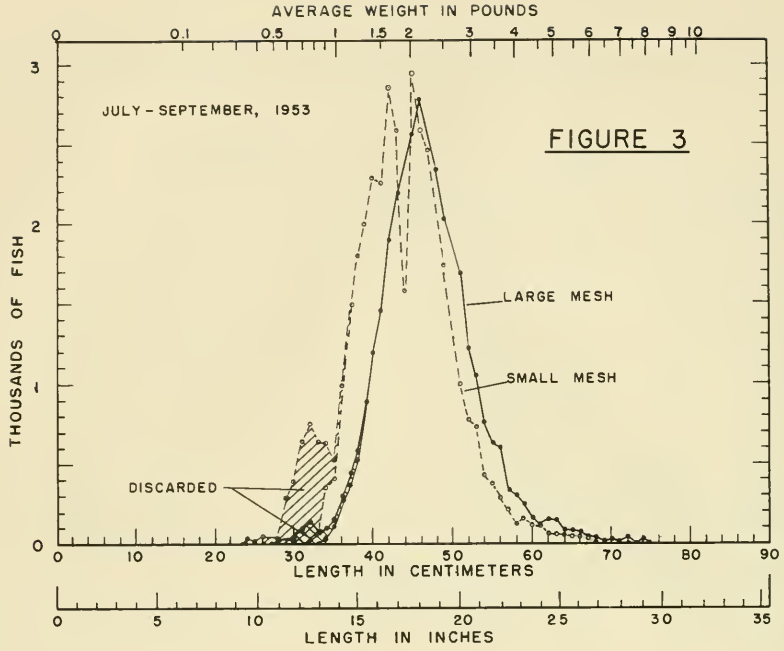
2/ Six large otter trawlers licensed to fish with small mesh from January to June, 1954: Bay, Bonnie, Bonnie Lou, Michigan, Racer, and Winchester.

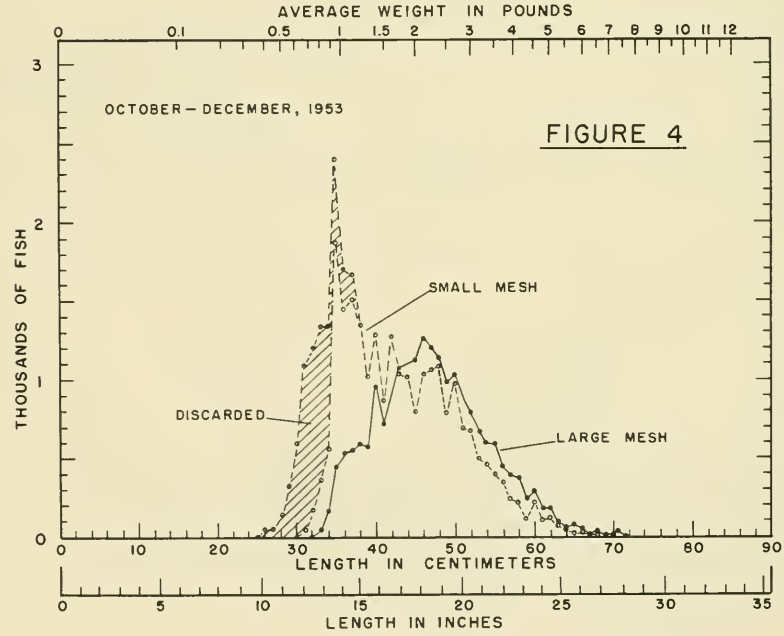
3/ 32 large otter trawlers using regulation gear.

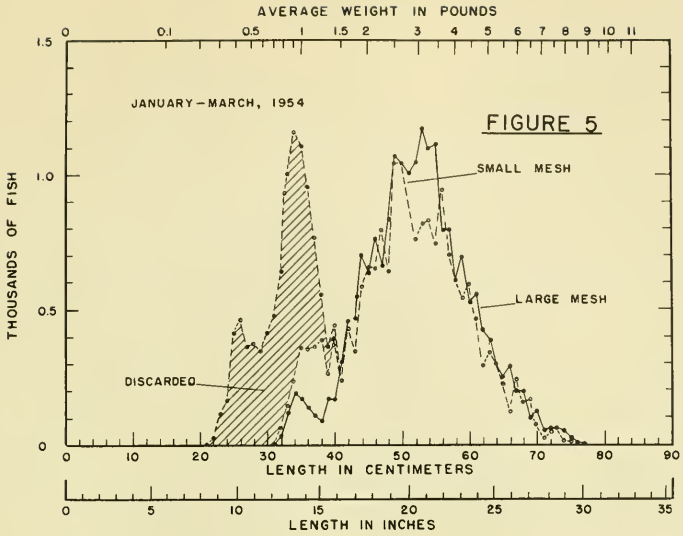
4/ 34 large otter trawlers using regulation gear.

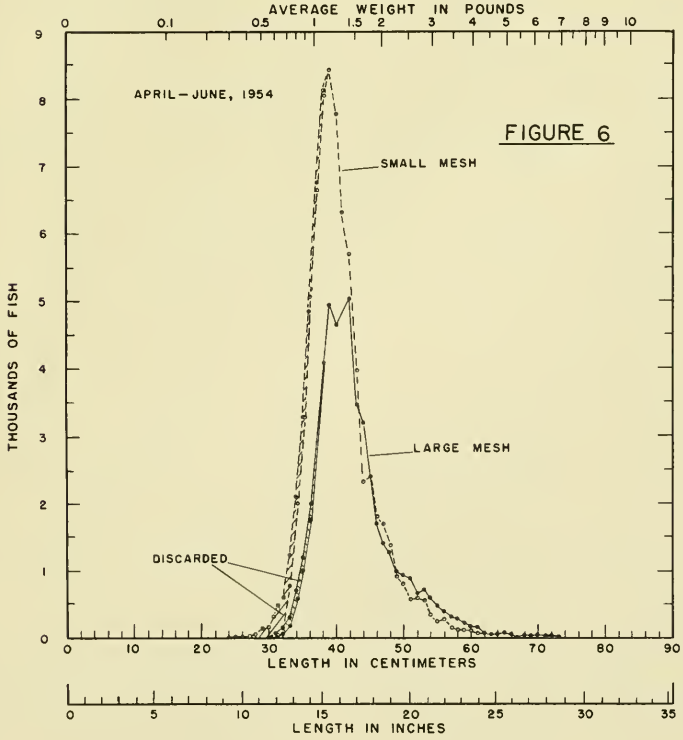

AVERAGE WEIGHT IN POUNDS
0 0.1 0.5 1 1.5 2 3 4 5 6 7 8 9 10 11
JANUARY–MARCH, 1953
FIGURE 1
SMALL MESH
DISCARDED
THOUSANDS OF FISH
0 1 2 3
0 10 20 30 40 50 60 70 80 90
LENGTH IN CENTIMETERS
0 5 10 15 20 25 30 35
LENGTH IN INCHES


AVERAGE WEIGHT IN POUNDS
0 0.1 0.5 1 1.5 2 3 4 5 6 7 8 9 10
APRIL–JUNE, 1953
FIGURE 2
SMALL MESH
DISCARDED
THOUSANDS OF FISH
0 1 2 3
0 10 20 30 40 50 60 70 80 90
LENGTH IN CENTIMETERS
0 5 10 15 20 25 30 35
LENGTH IN INCHES


AVERAGE WEIGHT IN POUNDS
0 0.1 0.5 1 1.5 2 3 4 5 6 7 8 9 10
JULY - SEPTEMBER, 1953
FIGURE 3
LARGE MESH
SMALL MESH
DISCARDED
THOUSANDS OF FISH
0 1 2 3
0 10 20 30 40 50 60 70 80 90
LENGTH IN CENTIMETERS
0 5 10 15 20 25 30 35
LENGTH IN INCHES


AVERAGE WEIGHT IN POUNDS
0 0.1 0.5 1 1.5 2 3 4 5 6 7 8 9 10 11 12
OCTOBER - DECEMBER, 1953
FIGURE 4
SMALL MESH
DISCARDED
LARGE MESH
THOUSANDS OF FISH
0 1 2 3
0 10 20 30 40 50 60 70 80 90
LENGTH IN CENTIMETERS
0 5 10 15 20 25 30 35
LENGTH IN INCHES


AVERAGE WEIGHT IN POUNDS
0 0.1 0.5 1 1.5 2 3 4 5 6 7 8 9 10 11
JANUARY – MARCH, 1954
FIGURE 5
SMALL MESH
LARGE MESH
DISCARDED
THOUSANDS OF FISH
0 0.5 1.0 1.5
0 10 20 30 40 50 60 70 80 90
LENGTH IN CENTIMETERS
0 5 10 15 20 25 30 35
LENGTH IN INCHES


AVERAGE WEIGHT IN POUNDS
0 0.1 0.5 1 1.5 2 3 4 5 6 7 8 9 10
APRIL – JUNE, 1954
FIGURE 6
SMALL MESH
LARGE MESH
DISCARDED
THOUSANDS OF FISH
0 1 2 3 4 5 6 7 8 9
0 10 20 30 40 50 60 70 80 90
LENGTH IN CENTIMETERS
0 5 10 15 20 25 30 35
LENGTH IN INCHES

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